

Winter Run Chinook Salmon
Draft Preliminary Example Biological Goals, Objectives, and Stressors Logic Chain for the BDCP
February 27th, 2012

Global Goal

Removal of the Sacramento River winter-run Chinook salmon ESU from the Federal List of Endangered and Threatened Wildlife (NMFS 2009). According to the NMFS draft recovery plan (2009), recovery and long-term sustainability requires:

- 1) Adequate protection for replacement of losses due to natural mortality (disease and stochastic events);
- 2) Sufficient genetic robustness to avoid inbreeding depression and allow for adaptation
- 3) Sufficient habitat (type, amount, and quality) for long-term population maintenance, and
- 4) Elimination or control of threats.

Global Objectives:

There are two components of Global Objectives that are relevant to the BDCP program. The first pertains to Recovery Plan goals based on Viable Salmonid Population (VSP) criteria, and further refined for the Central Valley in Lindley et al. (2007). The second component relates to Critical Habitat (as designated for Winter-run Chinook June 16, 1993; 58 FR 33212)

Global VSP Objectives include:

VSP1. Increase abundance

VSP2. Increase spatial distribution

a. Secure all extent populations (all populations are important because there are so many “missing” populations in the Central Valley)

b. Recover populations in each diversity group (only one diversity group for Winter-run)

VSP3. Protect and increase life history and genetic diversity

VSP4. Increase productivity (population growth rate = births-deaths)

Viable populations should demonstrate a combination of population growth rate and abundance that produces an acceptable probability of population persistence (NMFS Draft Recovery Plan).

Global Critical Habitat Objectives (from primary constituent elements)

CH1. Provide access to spawning areas on the Upper Sacramento River, including upstream passage of adults to spawning grounds

CH2. Provide adequate quality and quantity of spawning gravels

CH3. Provide for adequate river flows for successful spawning, incubations of eggs, fry development and emergence, and downstream transport of juveniles

CH4. Provide water temperatures for successful spawning, egg incubation, and fry development

CH5. Provide habitat areas and prey that are not contaminated

CH6. Provide riparian (including floodplain) habitat for successful juvenile development and survival

CH7. Provide adequate downstream migration corridors for successful emigration of juveniles

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WINTER RUN – GLOBAL ABUNDANCE GOAL LOGIC TREE						
Global Goal	Global Objectives	BDCP Goal	BDCP Objective	Assumed Stressor	Stressor Reduction Target	Cons. Measures
Increase winter-run Chinook salmon abundance	<p>Attainment of the winter-run Chinook salmon global abundance goal will occur by 2060 with achievement of 6-year geometric mean escapement levels of:</p> <p>20,000 in the mainstem Sacramento River with no year below 5,000;</p> <p>3,000 in the Battle Creek watershed with no year below 700;</p> <p>and 800 in a third viable population with no year below 200.</p>	Improved juvenile survival (as a proxy for abundance) within the Plan Area, SF Bay, and the nearshore ocean.	Double current survival rate of juvenile emigrants from Sacramento River through Delta (35%) to 70% ¹ .	Entrainment	Reduce entrainment of winter-run by at least 50% in all water year types	-Water Ops -Alternate migration routes
				Predation	-Decrease mortality from predation in (specify locations & months) by __%. -Increase quantity and quality of rearing habitat (including floodplain, channel margin, and riparian habitats) throughout the Delta	-Predator removal -Water Ops
				Limited Rearing Habitat	Increase average size of juveniles (relative to current conditions) as they migrate through the Delta to __% of their physiological maximum (corrected for temp)	-Yolo bypass -Suisun -Ammonia
				North Delta Diversion Facilities	Maintain survival rates through the reach containing new north Delta diversions to no more than a 2% loss per screen, and no more than a 5% cumulative loss.	-Water Ops -Alternate migration routes -Predator removal
				Limited Migration Flows	Maintain minimum Delta inflows in key migratory months	Water Ops
		Increase migration/spawning success of adult winter-run migrating through the Delta.	Eliminate human-induced passage delays or illegal take of winter-run adults in the Delta.	Migration barriers	Eliminate known human-caused passage impediments (chemical and physical) in the Plan Area	Fremont weir
				Poaching	Eliminate winter-run poaching in the Delta	Funding for game wardens

¹Estimate of 35% current survival is from Chinook Salmon Project Work Team. Survival varies by water year type, so survival would be measured

as a long-term average.

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WINTER RUN – GLOBAL SPATIAL DISTRIBUTION GOAL LOGIC TREE

Global Goal	Global Objectives	BDCP Goal	BDCP Objective	Assumed Stressor	Stressor Reduction Target	Cons. Measures
Increase spatial distribution of winter-run Chinook salmon	Attainment of the winter-run Chinook salmon global spatial distribution goal will occur by 2060 with restoration of two self-sustaining, independent populations in two watersheds of the Sacramento River drainage, and a third dependent population in the Sacramento River drainage.	Improved adult and juvenile migration success through the Delta to and from Sacramento River Basin (as a proxy for spatial distribution)	Eliminate human-induced adult passage delays (barriers that necessitate median passage time > 36 hrs.)	Migration barriers	Eliminate known human-caused passage impediments (physical) within Plan Area	Fremont weir
				Attraction flows	Provide Delta inflows > __cfs between __date__ & __date__.	Operations
			Create one alternate migratory path on the lower Sacramento River in > 40% of years.	Entrainment	Maintain Sac River winter-run entrainment at project pumps to < 2% of estimated smolt production in all water year types.	Water Ops
				Limited juvenile emigration routes	Ensure that at least __ % of juvenile winter-run emigrate through a non-mainstem channel route (e.g. flood bypass) in at least 40% of years.	-Yolo bypass -Fremont weir

WINTER RUN – GLOBAL LIFE HISTORY AND GENETIC DIVERSITY GOAL LOGIC TREE						
Global Goal	Global Objectives	BDCP Goal	BDCP Objective	Assumed Stressor	Stressor Reduction Target	Cons. Measures
Conserve and restore life-history and genetic diversity of winter-run Chinook salmon	<p>Protect and restore the full range of adult and juvenile life-history types migrating through the Delta .</p> <p>Attainment of the winter-run Chinook salmon global life history diversity goal will occur by 2060 with restoration of two self-sustaining, independent populations in two watersheds of the Sacramento River drainage, and a third dependent population in the Sacramento River drainage.</p>	Ensure that the project does not favor the survival of one life-history type over others.	Eliminate artificial selection for winter-run life-history types resulting from project operations (including hatcheries).	Hatchery Effects	Adopt hatchery practices that minimize adverse changes to life-history traits (e.g., size/age at smolting, age at maturity, migration timing) of wild winter-run Chinook.	Hatchery reform
				Hatchery Effects	Alter hatchery practices to minimize adverse changes in life-history traits of hatchery winter-run Chinook.	Hatchery reform
				Entrainment	Ensure that entrainment does not favor the survival of one life-history type over other types (e.g., early or late migrating smolts or adults)	Water Ops
				Flow Magnitude and Timing	To an equal degree across winter-run life-history types (e.g., size/age at smolting, age at maturity, migration timing) provide flows that support rearing and migration in all times and places where they occur.	Water Ops (including upstream)
				Rearing Habitat	Winter-run Chinook will have access to inundated floodplains > 45 days in at least 1 of 3 years,	Yolo Bypass